

Patent Claims:

1. An exhaust gas turbocharger (1) having a housing and having a shaft (2) which is arranged so as to be capable of rotating about its longitudinal axis in the housing and on which a turbine wheel (4) and a compressor wheel (3) are seated and which is guided in radial bearings (5, 6) which are embodied as magnetic bearings and in at least one axial bearing (9), the bearings (5, 6, 9) each having a bearing plate (12, 14, 16) which is seated on the shaft (2) and at least one stator (19, 20, 21, 22, 49, 50) which lies axially opposite said bearing plate on at least one side, thus forming a gap between the bearing plate and the stator, wherein at least one flow duct (62, 65), via which at least one bearing gap can have an air stream applied to it, is formed in the housing.
2. The exhaust gas turbocharger as claimed in claim 1, wherein the at least one flow duct opens into a compressor housing (64) of the turbocharger (1).
3. The exhaust gas turbocharger as claimed in claim 1 or 2, wherein the flow duct (62, 65) is formed at least in sections by a pipeline (65) running outside the housing.
4. The exhaust gas turbocharger as claimed in one of claims 1 to 3, wherein a separate flow duct leads to each of the bearings (5, 6, 9).
5. The exhaust gas turbocharger as claimed in one of claims 1 to 4, wherein the gaps of the bearings (5, 6, 9) communicate with one another via further flow ducts formed in the housing.
6. The exhaust gas turbocharger as claimed in claim 5, wherein the flow duct (62, 65) leads to only one of the

bearings, preferably to the turbine-wheel-side bearing (6).

7. The exhaust gas turbocharger as claimed in one of claims 1 to 6, wherein the housing has at least one outlet opening (63, 66) for the air which flows through the bearings (5, 6, 9).
8. The exhaust gas turbocharger as claimed in claim 7, wherein the outlet opening is formed by a gap between the housing and the shaft (2) in the region of the compressor wheel (3).
9. The exhaust gas turbocharger as claimed in one of claims 2 to 8, wherein the cross section of the flow duct (62, 65) is small in comparison with the cross section of a line, leading to the engine, for the compressed air.
10. A method for cooling magnetic bearings (5, 6, 9) of an exhaust gas turbocharger (1), the exhaust gas turbocharger having a housing and a shaft (2) which is arranged so as to be capable of rotating about its longitudinal axis in the housing and on which a turbine wheel (4) and a compressor wheel (3) are seated, and the bearings (5, 6, 9) having bearing plates which are arranged on the shaft (2) and stators (19, 20, 21, 22, 49, 50) which are fixed to the housing and are separated from said bearing plates by an air gap, wherein the bearing gaps have an air stream applied to them.
11. The method as claimed in claim 10, wherein the air stream is branched off as a partial stream from the air which is compressed by means of the compressor wheel (3).
12. The method as claimed in one of claims 10 or 11, wherein the air stream is led through a housing duct (62, 65) to at least one of the bearing gaps.

13. The method as claimed in one of claims 10 to 12, wherein the bearing gaps have an air stream applied to them independently of one another.
14. The method as claimed in one of claims 10 to 12, wherein the bearing gaps which are connected to one another via housing ducts have the air stream applied to them serially.
15. The method as claimed in claim 14, wherein the air stream is led through the bearing gaps from the turbine wheel side to the compressor wheel side.
16. The method as claimed in one of claims 10 to 15, wherein after the air stream passes through at least one bearing gap, the air stream is directed into the region outside the housing via an outlet opening.
17. The method as claimed in claim 16, wherein the outlet opening is provided by omitting a compressor-wheel-side shaft sealing ring.